

THE NEW *AURORA* SPECIES-GROUP OF THE GENUS *NEMOPHORA* HOFFMANNSEGG, WITH TWO NEW SPECIES FROM TAIWAN (LEPIDOPTERA, ADELIDAE)

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Nemophora aurora sp. n. and *N. uncella* sp. n. described from specimens collected in Taiwan form a monophyletic *aurora* species-group defined by two apomorphies: (1) dark brown lateral bands of forewing fascia with glossy silver-grey internal zone, (2) presence of small swelling bearing a tuft of long setae on oval depigmented spot at the base of valva in male genitalia. The *aurora* species-group is closely related to *degeerella* species-group.

Mikhail V. Kozlov, Laboratory of Ecological Zoology, University of Turku, Turku 20014, Finland.

Key words. – Nemomorpha; Adelidae; taxonomy; Taiwan.

Most of the East Palaearctic and Oriental species of the genus *Nemophora* Hoffmannsegg, 1798, have never been critically examined since Meyrick's (1912) catalogue or their original description. This explains the fact that only three of *ca* 20 species of this genus collected in Taiwan are identified yet (Heppner 1992). Two further species of *Nemophora*, which presumably form a monophyletic unit introduced here as *aurora* species-group, are described below.

The male genitalia were investigated and figured as described by Kozlov (1993). The interocular index was measured according to Davis (1975), being the ratio between the vertical diameter of the compound eye and the interocular distance measured at a point of the frons midway between the base of the antennal sockets and the anterior tentorial pits. Recent locality names are added in square brackets, whenever possible.

The type specimens are deposited in the U. S. National Museum of Natural History, Smithsonian Institution, Washington, D. C., U.S.A. (USNM) and the National Museum of Natural Science in Taichung, Taiwan, China (NMNST).

Taxonomic position of *N. aurora* and *N. uncella*

Two species described below share the following

characters with *degeerella* species-group: (1) Background forewing colour yellow to pale ochreous; (2) Dark forewing pattern with predominance of longitudinal stripes; (3) Forewing fascia consists of tree bands, the medial one being of the same colour as forewing background; (4) Basal part of forewing with characteristic pattern formed by silver-grey, dark brown bordered longitudinal stripes along costa, M and CuP veins, with some additional dark brown lines between these stripes.

The phylogenetic significance of these traits is not completely clear yet, and it can hardly be refined before the majority of *Nemophora* species is revised. However, characters 1 to 4 are regarded as apomorphies; among them, character 4 is presumably autapomorphic for the *aurora* and *degeerella* species-groups.

Monophyly of the *aurora* species-group is supported by the following synapomorphies: (5) Lateral bands of forewing fascia dark brown, with internal zone formed by silver-grey glossy scales; (6) Valva medially with small basal swelling bearing a tuft of long setae on small oval depigmented spot. Independent appearance of character (6) was reported for *N. ichnodesma* (Meyrick) (Kozlov 1995).

Key to the species based on external characters and male genitalia

1. External silver-grey band in forewing fascia complete; vinculum short ($< 3 \times$ length of valva); medial margin of valva distally without prominent lobe appearing laterally as a triangular protuberance *aurora*
- External silver-grey band in forewing fascia broken in the middle, and part adjacent to the costal margin is hook-shaped in such a way that its distal part is parallel to the costal margin; this distal part in some specimens is separated from the base and forms a distinct spot; vinculum long ($> 3 \times$ length of valva); medial margin of valva distally with prominent lobe appearing laterally as a triangular protuberance *uncella*

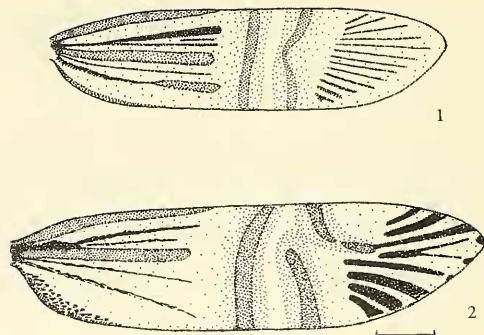
Nemophora aurora sp. n.

(figs. 1, 3 - 7)

Type material. - Holotype ♂: Taiwan, Tyokakurai, 26.III.1944, S. Issiki (Issiki Collection, USNM). - Paratypes: 3♂, same data as holotype. 2♂, 1♀, Taiwan, Baibara [? Nantou Co., Hsinseng], 24.III.1943, S. Issiki. 1♀, labelled as previous, except for date '25.III.1943'. 1♀, labelled as previous, except for date '27.III.1943'. 1♀, Taiwan, Tattaka [Nantou Co., Tatchia], 7.VI.1943, S. Issiki. 2♂, Taiwan, Musya [? Nantou Co., Lenai], 27.III.1943, S. Issiki. 1♂, Taiwan, E.VII.1947, Chingsing Li (all in Issiki Collection, USNM). 1♂, 2♀, Taiwan, Narou Co., Jean-ai, Songgang, 14.IV.1996, S. H. Yen (NMNST).

Description

Male. Forewing length 6.7-7.4 mm; wing expanse 14-15 mm. Vertex yellow, with admixture of brown hair-like scales; frons yellow. Compound eyes not enlarged (interocular index 0.6). Proboscis brownish yellow, base covered with yellow scales. Labial palpus long (about $1.6 \times$ vertical eye diameter), yellow, with brown tip and brown raised hair-like scales. Antenna $3.5 \times$ forewing length, with simple inwardly directed pegs on basal flagellar segments; scapus and base of flagellum brown, then the colour of flagellum changes clinally to grey. Tegula and thorax (dorsum) bronze. Forewing (fig. 1) yellowish ochreous, glossy bronze; basal area with three silver stripes (along costal, medial and postcubital veins) and some four or five dark brown lines. Apical quarter of forewing with numerous (10 to 14) narrow dark brown radial lines; in melanic specimens dark lines wide, creating impression of narrow yellow lines on dark brown background. Medial band of fascia yellow, bordered on both sides by wide ochreous bands with diffuse margins; central zone of these bands with



Figs. 1-2. *Nemophora*, forewing pattern. - 1, *N. aurora*; 2, *N. uncella*. Scale 1.0 mm.

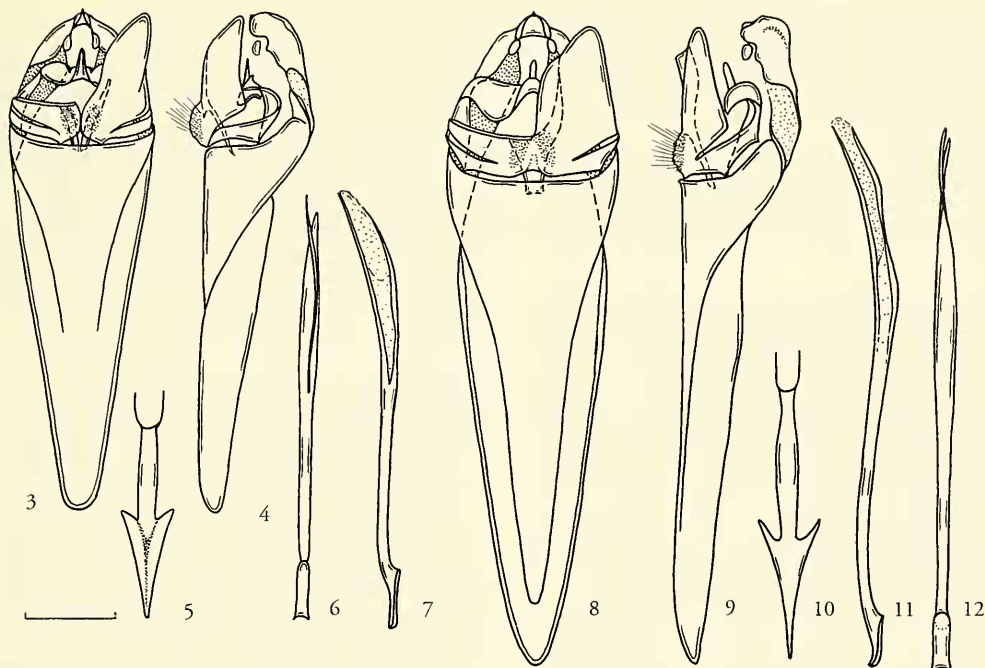
glossy silver-grey zone. Internal margin of the proximal ochreous band straight, almost indistinct from the ochreous background; external margin of the distal ochreous band convex in middle of forewing. Cilia bronze. Hindwing base grey, apex brown, glossy purplish; costal area light grey; cilia grey to bronze. Legs yellowish-brown to brown; tibia and all tarsomeres apically with yellow rings. Epiphysis at $1/2$ of fore tibia, almost reaching its tip. Abdomen brown.

Female. Forewing length 6.0-6.2 mm; wing expanse 12.5-13.2 mm. Antenna $1.4 \times$ forewing, brown; scapus and base of flagellum glossy purplish. Otherwise similar to male.

Male genitalia (figs. 3-7). Tegumen dome-shaped, with sharp medial ridge. Socii elongate, about same diameter as medial part of aedeagus. Vinculum with straight lateral margins, tip rounded. Length of valva c. $0.35 \times$ length of vinculum. Medial margin of valva ventrally with emargination at 0.4 valvar length; tip narrowly rounded. Valva medially with small ($1/3 \times$ length of valva, in lateral view); basal swelling bearing tuft of long setae on small oval depigmented spot. Valvae not accreted basally. Arrow-head of juxta narrow (width about $1/2 \times$ length), tip of arrow-head pointed. Distal half of aedeagus membranous, with two slightly curved narrow sclerotized bands; aedeagus basally of the same width as medially.

Biology

Moths were collected in the evergreen forest dominated by oak (*Quercus* spp.), with admixture of *Litsea acuminata*, *Cinnamomum* spp., *Castanopsis formosana*, *Ilex* spp., *Acer kawakamii* and *Lithocarpus* spp. Moths fly very high above the canopy layer; maximum activity occurred at 9 - 10 a. m. (S. H. Yen, pers. comm.).



Figs. 3-12. *Nemophora*, male genitalia. – 3, *N. aurora*, genital complex, ventral view; 4, same, genital complex, lateral view; 5, same, juxta; 6, same, aedeagus, ventral view; 7, same, aedeagus, lateral view; 8, *N. uncella*, genital complex, ventral view; 9, same, genital complex, lateral view; 10, same, juxta; 11, same, aedeagus, ventral view; 12, same, aedeagus, lateral view; scale 0.25 mm.

Nemophora uncella sp. n.
(figs. 2, 8-12)

Type material. – Holotype ♂: Taiwan, Hassenran [? Taichung Co., Pahsienshan], 24.x.1929, S. Issiki (Issiki Collection, USNM). Paratypes: 2♂, 1♀, labelled as holotype (Issiki Collection, USNM). 1♂, Taiwan, Syōrei, 12.viii.1943, A. Mutuura (Issiki Collection, USNM). 2♂, Taiwan, Hnalien Co., Tayulin-Tzer-en, 15.vii.1995, S. H. Yen (NMNST). 1♂, Taiwan, Natou Co., Jean-ai, Songgang, 14.iv.1996, S. H. Yen (NMNST). 2♀, Taiwan, Taichung Co., Hoping, An-ma-shan, 1800 m, 23.iii.1996, S. H. Yen (NMNST). 1♀, Taiwan, Kaohsiung Co., Maoling, Teng-Jur Area, 2200 m, 15-15.iv.1996, W. Y. Chou (NMNST).

Description

Male. Forewing length 8.2-8.7 mm; wing expanse 17-18 mm. Vertex yellow, with sparse brown hair-like scales; frons straw-yellow. Compound eyes not enlarged (interocular index 0.6). Proboscis yellow, with two lines of brown scales on the base of frontal surface. Labial palpus long (about $1.8 \times$ vertical eye diameter), straw-yellow, tip dorsally brown. Antenna

$3.8-4.1 \times$ forewing length, with simple inwardly directed pegs on basal flagellar segments; scapus and basal half of flagellum dark brown, glossy purplish, then colour of flagellum changes clinally to bronze. Tegula and thorax (dorsum) bronze, glossy gold. Forewing (fig. 2) straw-yellow; basal area with silver stripes (along costal and medial veins) and some four or five dark brown lines; dorsal margin dark in the basal one-third of the wing. Apical quarter with 7 to 9 suffuse dark brown radial lines; these lines are much shorter near costal margin than near ventral one. Medial band of fascia yellow, bordered on both sides by wide ochreous bands with diffuse margins; central zone of these bands with glossy silver-grey zone. Internal margin of the proximal ochreous band slightly convex, almost indistinct from the ochreous background. The silver-grey zone of distal band consists of two parts: the costal one turns towards the apex of the wing, forming a hook, whereas the dorsal part is slightly turned towards the wing base. Distal part of the dorsal hook-like strip in some specimens is isolated in a form of the elongate spot. Cilia bronze. Hindwing brown, slightly darker apically; costal area grey; cilia greyish-brown to brown. Legs yellow ven-

trally and brown dorsally, except for apical parts of tibia and tarsomeres which are yellow on both sides. Epiphysis at 1/2 of fore tibia, not reaching its tip. Abdomen brown dorsally, yellow ventrally.

Female. Forewing length 8.0 mm; wing expanse 16.5 mm. Antenna $1.5 \times$ forewing, brown; scapus and basal one-third of flagellum with appressed dark brown, glossy purplish scales. Otherwise similar to male.

Male genitalia (figs. 8-12). Tegumen dome-shaped, with sharp medial ridge. Socii elongate, about same diameter as medial part of aedeagus. Vinculum with straight lateral margins, tip almost pointed. Length of valva c. $0.30 \times$ length of vinculum. Medial margin of valva ventrally with prominent lobe appearing laterally as a triangular protuberance; tip of valva widely rounded. Valva medially with small ($< 1/3 \times$ length of valva, in lateral view) basal swelling bearing tuft of long setae on small oval depigmented spot. Valvae accreted basally. Arrow-head of juxta narrow (width about $1/2 \times$ length), tip of arrow-head pointed. Distal one-third of aedeagus membranous, with two slightly curved narrow sclerotized bands; aedeagus basally of the same width as medially.

Biology

For habitat characteristics, see *N. aurora*. Moths fly in the canopy and subcanopy layers, 7 - 20 m above the ground; maximum activity occurred at 9-10 a. m. and 15-16 p. m. Moths were observed feeding on flowers of *Lithocarpus formosana*, *L. kawakamii* and *Castanopsis longicaudata* (S. H. Yen, pers. comm.).

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